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CASE REPORT

Conservative treatment of spontaneous spinal epidural hematoma associated with oral anticoagulant therapy in a child

Jignesh Tailor · Ian F. Dunn · Edward Smith

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Abstract
Objective Spontaneous spinal epidural hematoma (SSEH) is rare in the pediatric population. This case report reviews the indications and strategies for nonoperative management in selected patients.
Methods An eight-year-old boy presented with back pain. There was no antecedent trauma, but the patient was anticoagulated for a mechanical heart valve. MRI revealed an epidural mass from T12 to L2 consistent with SSEH. The absence of focal neurologic deficits, combined with the high stroke risk with anticoagulation reversal, prompted a nonoperative approach. Clinical symptoms resolved over several weeks while maintaining therapeutic anticoagulation. Follow-up MRI demonstrated resolution of the hematoma.
Conclusion SSEH can present in the setting of poorly controlled therapeutic anticoagulation in the pediatric population. This case supports the premise that patients who present with SSEH without focal neurologic deficit can be successfully managed while maintaining therapeutic levels of anticoagulation. Close follow-up with frequent neurologic examinations, imaging and monitoring of the prothrombin time is mandatory.

Keywords Spinal epidural hematoma · Anticoagulation · Pediatric · Heart valve

J. Tailor · I. F. Dunn · E. Smith (✉)
Department of Neurosurgery, Children's Hospital Boston,
300 Longwood Avenue,
Boston, MA 02115, USA
e-mail: edward.smith@childrens.harvard.edu

Introduction

Spontaneous spinal epidural hematoma (SSEH) is a rare cause of spinal compression, particularly in children [2]. Since the first report by Jackson in 1869 [4], 30 pediatric cases of SSEH have been documented in the medical literature [7]. The majority of cases present with back or neck pain followed by rapidly progressive neurological deficit and usually require emergent surgical evacuation. Since the introduction of diagnostic magnetic resonance imaging (MRI) over the last decade, an increasing number of SSEH have been successfully treated with a conservative approach in adults, presumably because a greater number of SSEH that take a mild or benign clinical course are able to be visualized on MRI. However, in children there are still only a limited number of documented cases of SSEH that were treated nonoperatively [3]. Nearly all of these cases were treated conservatively to avoid the risk of perioperative bleeding in children with hemophilia. Although there have been numerous case reports of SSEH in adults who are maintained with long-term anticoagulant therapy, there are no case reports of this occurrence in children. Thus, we report the unusual case of a child with a spontaneous spinal epidural hematoma due to poorly controlled oral anticoagulation at the time of presentation and discuss how the child was treated successfully with conservative management.

Case report

An eight-year-old boy presented with acute onset of severe mid to low back pain radiating down his legs, more on his right than on his left. He has a complex past medical history of Marfan's syndrome and aortic valve disorder that was

treated with a St Jude's mechanical heart valve. He has been maintained with anticoagulation with coumadin since then. His international normalized ratio (INR) was 8.0 the day after his presentation; significantly greater than his target (2.5–3.5). One week previous to the onset of symptoms his INR was recorded at 3.5 and climbing, secondary to a bout of bronchopneumonia treated with intravenous antibiotics.

The patient developed the onset of severe back pain refractory to oral analgesics. No trauma was noted on review of the history. The persistent pain prompted the physician to schedule a CT scan for evaluation. Detailed review of the CT identified a probable spinal epidural hematoma. MRI studies were subsequently ordered and these images disclosed a large epidural mass in the lumbar region extending from the bottom of T12 to the top of L2, consistent with a diagnosis of spinal epidural hematoma (Fig. 1). With this finding, the patient was referred for neurosurgical consultation.

By the time these studies had been completed, 1 week had elapsed from the onset of symptoms. He was examined by a neurosurgeon immediately after the MRI, on the same day that the consultation was requested. When he was evaluated by the neurosurgeon, his pain had markedly diminished and he required only one tablet of Vicodin a day; a fivefold reduction in comparison to presentation. The patient never had any bowel or bladder dysfunction, nor did he have any demonstrable weakness or sensory deficit. His neurological examination was normal.

Consultation was made with the patient's cardiologist. Given that his pain had markedly improved and that he had no obvious neurological dysfunction, coupled with the significant risk of stroke in the setting of reversing anticoagulation with a mechanical heart valve, the decision was made to treat nonoperatively and maintain his INR in a therapeutic range. He was examined weekly to monitor for changes in his neurologic examination. A repeat MRI scan 2 weeks after the onset

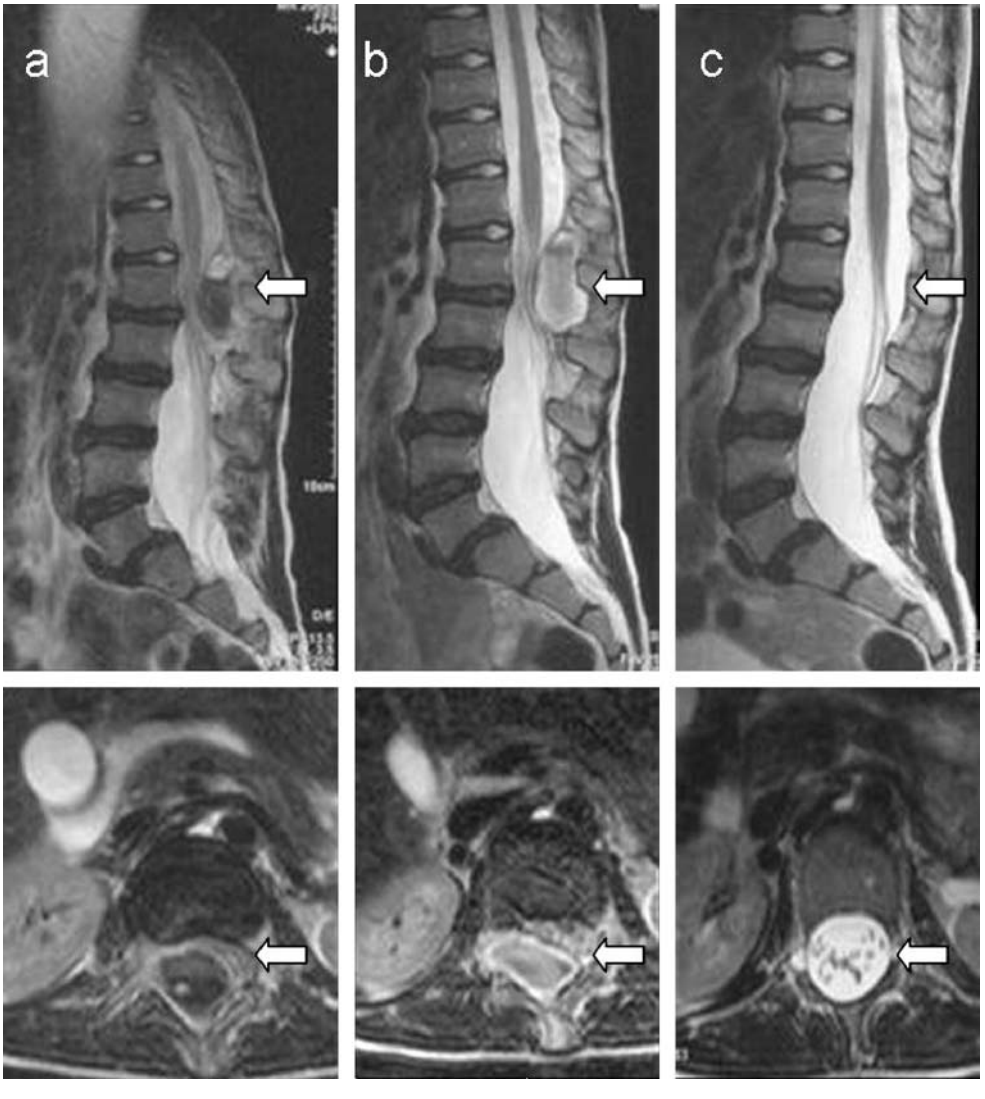

Fig. 1 Sagittal and axial T2 weighted MRI images of the spine of an eight-year-old boy (**a**) at initial presentation (1 week after symptom onset), (**b**) during follow-up (3 weeks after symptom onset–2 weeks after previous MRI) and (**c**) 10 weeks after onset of symptoms. At initial presentation (**a**) there was a lobulated epidural mass in the posterior spinal canal measuring 6×4 cm. The mass was focused at L1, narrowed the AP dimension of the canal, and displayed heterogeneous signal intensity. At 2 weeks (**b**), the mass showed expected evolution of signal changes consistent with breakdown of blood products. At 10 weeks after the onset of symptoms (**c**) there is complete resolution of the hematoma with no residual identified on imaging

of symptoms revealed that the epidural hematoma was stable. At 10 weeks, the patient reported no pain, his INR was well-controlled within the target range, and an MRI scan showed complete resolution of the hematoma (Fig. 1).

Discussion

While anticoagulant therapy is valuable for reducing the risk of stroke in patients with mechanical heart valves, it should be used with caution. Here, we report a case of SSEH in a child who was maintained on an inappropriately high international normalized ratio (INR), and subsequently developed an epidural hematoma in the thoraco-lumbar segment of the spine. The association between anticoagulant therapy and SSEH is well-documented in adults [1, 5, 8, 10]; however this is the first report of such a case in the pediatric population. This case illustrates that children are just as susceptible to the potential hazardous complications of anticoagulant therapy and require frequent and stringent monitoring of prothrombin time and INR.

The most common site for SSEH in children is the cervicothoracic segment of the spine [3, 6], however the affected segment in this case was T12 to L2. This atypical finding may be explained by the uncommon circumstances in which the SSEH occured; in the setting of long-term anticoagulation. In support of this, Zuccerrello et al. reported that the thoracic and lumbar spine is the most commonly affected site for SSEH in adults when it occurs in the setting of anticoagulant therapy [10].

While many clinicians would often recommend surgical evacuation of the hematoma and correction of the INR to normal levels, the decision to treat this case nonoperatively was based on the significant risk of stroke if anticoagulation were reversed for surgical intervention, as well as the subacute presentation and absence of focal neurological symptoms and signs. It is important to note that the decision to treat conservatively is not always based on a mild clinical course. Groen reported several cases of adults with severe neurological deficit after SSEH who were managed conservatively because of the coexistence of coagulopathy and/or the anticipated risks of operative treatment [3]. Though the functional recovery of these patients may not be complete, the SSEH resolves and the patient is protected from the significant risk of surgical intervention. Other important factors to consider in the decision to treat conservatively include the clinical improvement of symptoms in the first 24 h from onset and the size of the hematoma. Multilevel acute epidural hematoma may be difficult to treat operatively in patients with coagulopathy [9].

The purpose of this case report is to highlight specific instances when nonoperative management of spinal epidural hematomas in children is justified. This specific presentation has not previously been described in children and the general principles discussed are relevant to a wider range of children who may present with similar scenarios. Careful repeated neurologic examinations of these patients are mandatory, as is close consultation with their associated medical teams.

Conclusions

Spontaneous spinal epidural hematomas can present in the setting of poorly controlled therapeutic anticoagulation in the pediatric population. This case supports the premise that patients who present with these hematomas without focal neurologic deficit can be successfully managed while maintaining therapeutic levels of anticoagulation — a strategy with particular relevance for children at high risk of stroke with reversal of anticoagulation (such as with a mechanical heart valve or recent arterial dissection). Close follow-up with frequent neurologic examinations, imaging studies and careful monitoring of the prothrombin time is mandatory.

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